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Probing Novel States of Iridates and Ruthenates under Extreme Conditions[1] JASMINKA TERZIC, HAO ZHENG, Center for Advanced Materials and Department of Physics and Astronomy, University of Kentucky, Lexington, KY 40506, USA, PANPAN KONG, CHANQING JIN, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, DANIEL HASKEL, Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois 60439, USA, OLEKSANDR KORNETA, Center for Correlated Electron Systems, Institute for Basic Science (IBS), Seoul National University, Seoul 151-742, Korea, SHUJUAN YUAN, GANG CAO, Center for Advanced Materials and Department of Physics and Astronomy, University of Kentucky, Lexington, KY 40506, USA — The highly delicate balance between competing energies in materials of interest makes high-pressure and high-magnetic-field powerful probes for generating novel states. Our studies have uncovered a number of remarkable properties of iridates and ruthenates under extreme conditions: avoidance of metallization at high pressures, absent conventional correlations between magnetic and insulating states in iridates; coexistence of a bulk insulating state and quantum oscillations period in 1/B or B (depending on the orientation of B which is applied magnetic field), and colossal magnetoresistivity without spin polarization in ruthenates. We will present and discuss our results with comparison drawn with relevant systems.

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